Factors Correlating with Adoption of the Integration System of Paddy-Livestock in Central Sulawesi Province, Indonesia

Anna Fatchiya[1], Istiqlaliyah Muflikhati[2], Tatie Soedewo[1]

[1]Department of Communication and Community Development Science, Faculty of Human Ecology, Bogor Agriculture University
[2]Department of Science of Family and Consumer, Faculty of Human Ecology, Bogor Agriculture University

Abstract

The Indonesian government has introduced a paddy-livestock integration system to the farming community. However, the rate of adoption by farmers is still insignificant. For this reason, this study aimed to analyze the factors influencing their adoption level on technological innovation in the paddy-livestock integration system. The data was collected through Focus Group Discussions (FGD) to get qualitative data and surveys for quantitative data. FGDs were conducted in three locations (in the two villages of research with farmer groups and in AAAT). The survey used a questionnaire involving a sample of 120 people in the two villages, 60 from each. Data were analyzed descriptively (sum, average, and percentage) and tested with Spearman Rank correlation. The data processing used the software Excel and SPSS ver 16. The research result showed that there was a correlation between the factors (of farmer characteristics, innovation, and external support) and the stages (knowledge, interest, and adoption) of farmers in adopting the technological innovation of paddy-livestock integration system using fermented feed and organic fertilizer

Keywords*: adoption, innovation, integrated farming, livestock, paddy*

Abstrak

Pemerintah telah memperkenalkan sistem integrasi padi-ternak kepada masyarakat petani. Namun, adopsi petani terhadap inovasi ini masih rendah. Oleh karenanya tujuan penelitian ini adalah menganalisis faktor-faktor yang berhubungan dengan tingkat adopsi petani terhadap inovasi sistem integrasi padi ternak. Lokasi studi di dua desa di Kabupaten Sigi, Sulawesi Tengah, Indonesia yaitu Desa Sidondo III dan Desa Pandere. Data dikumpulkan dengan pendekatan Focus Group Discussion (FGD dan survei dengan jumlah sampel sebanyak 120, masing-masing desa terdiri atas 60 orang. Data yang telah terkumpul dianalisis secara deskriptif (jumlah, ratan, dan persentase) dan diuji korelasional dengan Rank Spearman. Pengolahan data dilakukan dengan bantuan program excell dan SPSS ver 16. Hasil penelitian menunjukkan bahwa terdapat hubungan antara faktor karakteristik petani, karakteristik inovasi, kegiatan penyuluhan pertanian, dukungan luar diri petani dengan tahapan adopsi petani pada sistem integrasi padi-ternak yang berupa inovasi teknologi pakan ternak fermentasi (silase) dan pupuk organik.

Kata kunci: adopsi, inovasi, sistem integrasi pertanian, ternak, padi

Background

Indonesia is known as an agricultural country, but in fact the Indonesian government still had to import raw or processed foods with sizeable value and volume i.e. 5.36 billion US dollars and 11.33 million tons in January-June 2011 and was expected to increase up to 15.4 million tons with US $ 7.73 billion worth in 2013 (Central Bureau of Statistics Indonesia, 2011). There were quite enough variety of imported food types, at least 28 species, ranging from paddy, corn, soybeans, wheat, flour, sugar, cane sugar, beef, chicken, until cassava.

The Indonesian government attempted to suppress the value of imported foods by increasing domestic food production. This was done by extending agricultural land or intensification in order to increase the intensity of agricultural business management. The first way, crop businesses, required enormous costs and caused a negative impact on the environment, for example clearing the forest, scoring the fields, which was very expensive. In contrast, the second way i.e. intensification which was rated less did not require a very big cost to expand the important land management of agricultural enterprises, since it was carried out as efficiently and intensively as possible. One of the techniques of agricultural intensification is an integrated farming system.

Integrated farming systems are well known for farmers in Indonesia, such as paddy with freshwater fish and

[1]Korespondensi penulis
E-mail: annafatchiya@yahoo.com

plants in West Java, and cocoa with cows in West Sumatra. However, farmers in Central Sulawesi were not familiar with the integration system of agriculture, especially paddy with livestock. Potential paddy and livestock in Central Sulawesi, especially in Sigi was quite large. The planting area of paddy was 41,951 ha and harvested area of 39,854 ha and a population of 17,923 cattle (Department of Agriculture, Animal Husbandry and Fisheries in Sigi District, 2014). Nearly all households have cows or buffalos, with an average of two. Even some of them have dozens.

Indonesian government through the Indonesian Agency for Agricultural Research and Development Ministry of Agriculture (IAARD) has introduced a system of integrated farming, including paddy-livestock integration into the farming community. With the integration system, both paddy and cattle would get mutual benefits, such as each integrated land distribution and utilization of waste from each component. Interconnectedness of various components of integration systems enhanced the growth of farmers' income which led to sustainable regional economic growth (Djajanegara 2005, Suryanti 2011). Furthermore, crop-livestock integration would likely improve the welfare of farmers, promote economic growth, enhance food security, and maintain environmental sustainability.

For the community, agricultural technology in the livestock-rice integration system introduced by IAARD, such as the utilization of paddy waste for animal feed, namely the fermentation of rice (silage) and cattle waste for organic fertilizer was a new thing, so it could be considered as innovation. Novelty is a key word in terms of innovation, as defined by Rogers (2003) and van den Ban and Hawkins (2002). Novelty is not only about technical aspects, just like technology, but more broadly, because innovation can also be found in social and collective dimensions according to Leeuwis (2009), such as community group setting, marketing, new forms of interaction and so on.

IAARD introduced paddy-livestock integration system to farmers through agriculture extension approaches. However, the rate of adoption by farmers did not show a significant increase. Adoption is interpreted as someone's acceptance to something outside his psychological perception, something that is not generally new for him. A new understanding is relative and limited by the dimensions of time. This means that something new to someone might not be necessarily new to others. Rogers (2003) assert that adoption is a process of mental or behavioral changes, both from cognitive, affective and psychomotor aspects of a person since he first knew the innovation until he decided to adopt such innovations. According to Rogers (2003) there were five stages of adoption, i.e. knowledge as knowledge is the introduction stage to innovation, interest, the formation of attitudes, decision, implementation and confirmation.

Allegedly due to low adoption, the agricultural extension process became less effective, for example, inaccuracies in selecting methods of counseling and mentoring, lack of intensity, and lack of support means, support of natural resources, support from community leaders, and support from farmer's groups. Referring to the opinion of Rogers (2003) farmers that adopt more quickly were those of younger class, and those with better education and better economic conditions. Therefore, this study aimed to analyze the factors that were correlated with the stages of adoption, starting from knowing innovation (knowledge), interest, and implementation or adoption.

Methods

The data collection was conducted by Focus Group Discussion (FGD) to get qualitative data and surveys for quantitative data. Research location was in Sigi District, Central Sulawesi, Indonesia. There were two villages: Sidondo III and Pandere. FGDs were conducted in three locations: in the two villages of research with farmers groups, and in IAARD. The data collected consisted of respondent characteristic data (age, work experience, education, land ownership, and livestock ownership), respondent perception on agricultural extension (methods and intensity of agricultural extension), external support (support from community leaders, natural resource, facilities, and famer's group), innovation characteristics (complexity, compatibility, observability, trialability, relative advantages), and adoption processes occurring from knowledge, interest and implementation i.e. organic fertilizer and fermentation feed. The survey used a questionnaire with a volume of about 120 people in the two villages, 60 each. Data were analyzed descriptively (sum, average, and percentage) and tested with Spearman Rank correlation. The analysis process was assisted by

the instrument software Excel and SPSS ver 16.

Results and Discussion

The description of farmers' socio-economic conditions at the study sites generally showed low levels, such as low education levels, narrow land ownership and small numbers of livestock. Even some farmers did not own land and livestock. Farmers were also dominated by old age and low work experience, although there were some young respondents who were involved in agriculture (Table 1).

Table 1: Description of Respondents

Variable	Villages					
	Sidondo III			Pandere		
	Mean±dev std	Min	Max	Mean±dev std	Min	Max
Age (years)	40,33±11,71	20	82	47,13±13,04	20	72
Work experience (years)	15,32±11,85	1	50	21,97±12,99	2	60
Level of education (years)	7,27±3,14	0	17	8,12±3,47	0	16
Land ownership (Ha)	0,82±0,84	0	4	0,99±1,42	0	10
Livestock ownership (tail)	1,17±1,51	0	7	3,32±6,04	0	35

The farming communities in both research villages generally controlled their fields with their own status, with only a few land lease status. However, some of them did not have rice fields. The average ownership of rice field was less than one hectare, in Sidondo III 0.82 ha and in Pandere Village 0.99 ha, but the area of this land was higher than the average land ownership in Java Island, i.e. below 0.25 ha. Although the rice fields owned by farmers were wider, the productivity was still lower than in Java; the average was still around 4-6 tons / ha, while in Java it reached 8-10 tons / ha.

Farmers have not used much of the rice waste that is straw. The existing straw is burned directly in the fields. Farmers who generally have cattle and buffalo do not use straw as animal feed. Generally their livestock is fed with grasses around it or cattle searching for their own feed by being released in open areas both in pastures, fields that are not planted, even in residential areas. Only a few farmers who cage their livestock, so there is not a lot of potential livestock manure to be used as organic fertilizer

Extension program of paddy livestock integration system initiated by IAARD Central Sulawesi seeks to introduce farmers to the use of hay and livestock to increase the production of paddy and livestock farmers while improving the quality of the environment. Farmers are introduced with technique of organic fertilizer and silage feed. However, the rate of farmer adoption on innovation technology is still low. Even these two innovations have never been known to all farmers. However, farmers who already know but have not applied it, are interested to apply it in Sidondo III Village (Table 2) and Pandere Village (Table 3).

Referring to Table 2 and Table 3, the adoption stage shows that not all 60 respondents were aware of the innovation of silage feed and organic fertilizer introduced to them. Furthermore, from a number of farmers who know, not all are interested to apply it. Similarly, the interested farmers are not all using both types of innovation in the farm. Farmers' knowledge about the use of straw and manure for livestock feed and fertilizer is still very low. One of them is indicated from the ignorance of farmers that straw is a cattle feed. Similarly, they are also ignorant that straw can be processed into nutritious feed. Farmers' ignorance is lower on the knowledge that feed from straw that has been treated through fermentation or so-called silage can fatten the cows and the knowledge of how to make silage (Table 4). Zander et.al (2013) study shows that the farmers' low knowledge causes their adoption rate to techniques of increasing livestock production to become low.

The interest of respondents who know about silage feed and organic fertilizer is quite high in both study villages (Table 2 and Table 3). When compared to respondents' interest in both villages, the interest of respondents in Sidondo Village III is slightly higher than that of Pandere Village.

The respondents' interest arises from what the

Table 2. Distribution of Respondents Based on Stages of Adoption of Silage Feed and Organic Fertilizer in Sidondo III Village

Stages of adoption	Silage feed			Organic fertilizer		
	Amount	Percentage of respondents	Percentage from the previous stage	Amount	Percentage of respondents	Percentage from the previous stage
Amount of respondents	60	100	-	60	100	-
Knowing (knowledge)	45	75	75 (=45/60)	47	78	78 (=47/60)
Interested	40	67	89 (=40/45)	38	63	81 (=38/47)
Adopt	10	17	25 (=10/40)	16	27	42 (=16/38)

respondent sees, hears, and experiences by both technological innovations. Although not all respondents have applied innovation, from what is seen from the neighbors who apply it, respondents expressed interest or interested to apply. This interest arises from positive farmers' perceptions of both innovations, whether viewed from connectivity, compatibility, observability, trialability, and relative advantages compared with old technology or habits made by farmers.

Judging from the total number of respondents who adopted the innovation of silage feed and organic fertilizer, there was no half, i.e. 17% and 27% in Sidondo Village III, and 27% and 35% in Pandere Village. When compared to both types of innovation, the processing of fermented straw (silage) is less applied than organic fertilizer from livestock manure in both study sites. This is related to the time of introduction of respondents to organic fertilizer which is longer than to silage.

The introduction of farmers on the integration system of cattle-paddy especially silage technology innovation, solid and liquid organic fertilizer, was determined by socialization and counseling provided by IAARD Central Sulawesi. Similarly, farmers came to the stage of applying it because of the intensity of extension conducted by IAARD. Few respondents stated that they knew the two innovations from the mass media.

The rate of farmer's adoption is related to conditions within the farmer and from the nature of the innovation itself. The results showed that farmers' internal factors, innovation characteristics, and external support are related to the farmer's adoption rate on technological innovation of rice-cattle integration system in the form

Table 3. Distribution of Respondents Based on Stages of Adoption of Silage Feed and Organic Fertilizer in Pandere Village

Stages of adoption	Silage feed			organic fertilizer		
	Amount	Percentage of respondents	Percentage from the previous stage	Amount	Percentage of respondents	Percentage from the previous stage
Amount of respondents	60	100	-	60	100	-
Knowing (knowledge)	42	70	70 (=42/60)	44	73	73 (=44/60)
Interested	27	45	64 (=27/42)	33	55	75 (=33/44)
Adopt	16	27	59 (=16/27)	21	35	64 (=21/33)

Table 4. Percentage of Respondents Based on Knowledge of Rice and Cattle Waste Utilization

Knowledge	Sidondo III Village		Pandere Village	
	Know	do not know	Know	do not know
Silage feed				
Straw as animal feed	72	28	67	33
Straw can be processed	55	45	65	35
Silage fattening cows	62	38	50	50
How to make silage	10	90	20	80
Organic fertilizer				
Cow manure as fertilizer	75	25	65	35
Organic fertilizers are good for the environment	65	35	58	42
How to make organic fertilizer	12	88	33	67

of silage feed and organic fertilizer (Table 5 to Table 11).

Farmer's Characteristics Level relationship with Adopted Innovation

Characteristics of the farmers in the form of education, land ownership and livestock ownership were related to the stage of knowledge, and to the phase associated with livestock ownership interest in the technology of organic fertilizer. As for fermented feed, only variable of work experience was related with the adoption at the stage of implementation (Table 5 and Table 6).

Farmers who were highly educated, had a broader area, and had more cattle proved more knowledgeable about organic fertilizer (Table 5). Highly educated farmers tended to have a sense of curiosity about something and would try to find information about such a thing. Information was obtained from various sources, especially from the extension and the mass media. Similarly, farmer's higher socio-economic condition, which was characterized by the ownership of larger farms and livestock, made him more likely to desire more and try to get information or innovation, because, in most cases, this group's interest could develop their business.

Livestock farmers tend to have higher interest to use organic fertilizers. Farmers assume many animals that produce much more manure would benefit if the dirt lot is used as organic fertilizer.

Slightly different from the organic fertilizer, the factor related to the adoption of silage is only work experience of farmers, i.e. at the stage of implementation (Table 6). This means the longer the farmers are involved in the field of fermented feed farm the more they tend to

Table 5. Values and Significant Correlation Coefficient of Farmer's Characteristics with the Adoption Stage of Organic Fertilizer

Farmer's characteristics	Adoption Stage of Organic Fertilizer					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
Age	-.015	.873	-.007	.879	.170	.064
Work experience	-.022	.814	-.014	.879	.119	.196
Level of educatioan	**.240****	.009	.055	.550	-.069	-.242
Land ownership	**.221***	.016	.095	.304	-.102	.266
Livestock ownership	**.183***	.045	**.212***	.020	.116	.208

* significant at $\alpha \leq 0.005$ and the value on ≤ 0.001 **

Table 6. Values and Significant Correlation Coefficient of Farmer's Characteristics with Adoption Stage of Fermented feed

Farmer's characteristics	Adoption Stage of Fermented Feed					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
Age	-.011	.931	-.042	.647	.155	.092
Work experience	.150	.247	-.086	.352	**.187***	.041
Level of education	.029	.822	-.004	.962	.006	.944
Land ownership	.120	.358	.120	.160	.-137	.136
Livestock ownership	.131	.316	.230*	.012	.159	.083

* significant at $\alpha \leq 0.005$ and the value on ≤ 0.001 **

apply it. Based on the experience of the farmers, the farmers are able to take the best decision for farming, including the decision to implement this fermented feed.

Relationship of the Support Extension Level with Adopted Innovation

Agricultural extension carried out to introduce organic fertilizers and fermented feed proved to be positively related to the level of the farmer's adoption (Table 7 and Table 8). Judging from the suitability of the methods used for significant organic fertilizer at the stage of knowledge, we can see that the intensity factor is positively related to the three stages of adoption (Table 7). As for fermented feed, the significant factor is the intensity of extension methods at all stages of adoption (Table 8).

The effective method that is measured from its suitability to improve farmers' understanding of the material given proved to increase the farmer's adoption to apply organic fertilizers and fermented feed. The method used in the extension of paddy-livestock integration system that uses a direct approach to practices such as Field School (FFS) and a dialogical approach such as extension field visits to farmers are likely to increase the knowledge and interest of farmers to apply organic fertilizer. In contrast, the method that has no practice and is not linear is likely to cause farmers not to understand the material, to have lack of interest, and not to apply innovation delivered

High-intensity counseling will also tend to increase the farmer's adoption to use organic fertilizers and silage for livestock feeding. Besides the intensity of the frequency of visits, the intense frequency of counseling implementation is also important. Therefore, the more frequently the extension workers visit farmers and give counseling, the higher the rate of adoption of innovations in paddy-livestock integration system.

Relationship of the External Support Level with Adopted Innovation

External factors are conditions outside the farmers which can influence the rate of adoption of technological innovations paddy-livestock integration system introduced by IAARD. There are four external factors found in this study, namely the support of community

Table 7. Values and Significant Correlation Coefficient of Farmer's Characteristics with Adoption Stage of Support Extension Organic Fertilizer

Support Extension	Adoption Stage of Organic Fertilizer					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
Methods suitability	**.318****	.000	**.261****	.004	.165	.071
intensity of extension	**.364****	.000	**.251****	.006	**.239****	.009

* significant at $\alpha \leq 0.005$ and the value on ≤ 0.001 **

Table 8. Values and Significant Correlation Coefficient of Farmer's Characteristics with Adoption Stage of Support Extension Fermented feed

Support Extension	Adoption Stage of Fermented Feed					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
Methods suitability	**.312***	.014	**.271****	.003	**.204***	.025
intensity of extension	**.364****	.004	**.417****	0.00	**.284****	.002

* significant at α ≤ 0.005 and the value on ≤ 0.001 **

leaders, natural resources, facilities, and farmer groups.

On the innovation of using organic fertilizer, these four support factors are seen to be significantly associated with the farmer's adoption, which is at the stage of knowledge and application, while the interest is related to the support of community leaders and farmer groups (Table 9). The innovation of feeding silage related to the stage of knowledge is the support of community leaders and support groups, at the stage of interest is the support of community leaders, and at the implementation stage is the support of community leaders, support of natural resources, and support of groups (Table 10).

Community leaders an important role in increasing farmers' adoption both to the use of organic fertilizers and fermented feed. Informal character, namely the RT / RW and religious figures higher influence in the village of study compared to the formal leaders, such as village heads. This informal community leaders generally respected and trusted by the public, so that the information conveyed through this figure will be more easily accepted by the village community including information about both technologies. Therefore, in the organization of counseling is important to involve the informal leaders in the implementation, in order to gain legitimacy and readily accepted by the public.

The condition of natural resources in accordance with the application of the use of organic fertilizer and fermented feed also proved positive correlation with the rate of adoption. That is, the lower the compliance of the condition of the land in the study area with the innovation, the lower the adoption, and vice versa. In the conditions in the study area the number of adopters is still small, it had to do with the public's assessment that the innovations introduced that require land that is not comprehensive and livestock are grounded so that the dirt can be collected, while the condition of grazing lands for cattle they are still quite broad and not allow it to gather the dirt cattle in the pasture. Though the fact that cattle farmers tend to lean.

Support means proved instrumental in improving the application of organic fertilizer, contrary to the fermented feed. This suggests that the availability of organic manufacture which is simple and inexpensive will encourage farmers to adopt it, while whether it is easy or difficult to get equipment for the fermented feed has nothing to do with the implementation of both these innovations.

Table 9. Values and Significant Correlation Coefficient of Farmer's Characteristics with External Support of Adoption Stage of Organic Fertilizer

External Support	Adoption Stage of Organic Fertilizer					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
community leaders	**.342****	0.000	**.270****	.003	**305****	.001
natural resources	**.344****	.000	.156	.088	**.380****	.000
Facilities	**.213***	.020	.166	.071	**.283***	.002
farmer groups	**.322****	.000	**.263****	.004	**.279****	.002

* significant at α ≤ 0.005 and the value on ≤ 0.001 **

Table 10. Values and Significant Correlation Coefficient of Farmer's Characteristics with External Support of Adoption Stage of Fermented Feed

External Support	Adoption Stage of Fermented feed					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
community leaders	**.422****	.001	**.399****	0.000	**.344****	.000
natural resources	.164	.207	.161	.079	**.350****	.000
facilities	.214	.098	.106	.250	.268	.000
farmer groups	**.356****	.005	.283	.002	**.302****	0.001

* significant at α ≤ 0.005 and the value on ≤ 0.001 **

Support farmers' groups also proved instrumental in increasing farmers' adoption in the use of both organic fertilizers and fermented feed. This means that the group is actively encouraging its members to apply both of these innovations, including the activity of farmer groups as leaders of farmer groups. Like other farming communities in Indonesia, farmers in the study area live in a culture which among others is characterized by gemeinschaft; the bond is still strong with the Q norms and tradition values, and high cohesiveness. Thus togetherness in the group life becomes important, and the group's behavior affects the behavior of individuals within it. Likewise, the role of community leaders, particularly the informal leaders are more rooted in the community and very strong compared to the formal leaders in directing the behavior of members of the public. Local leaders become role models and have the authority and credibility in the community. To that end, the extension workers must obtain legitimacy from the local leaders in organizing education in the villages, in order to facilitate the achievement of the goals of the outreach program.

Relationship between Innovation Characteristics and Adoption Rate

Characteristics of innovation are correlated with the rate of the adoption of organic fertilizers and fermented feed as technological innovations on the integration system of cattle-paddy (Table 11 and Table 12). This means that the farmer with a positive perception of the properties of these two innovations will encourage other farmers to adopt it.

In organic fertilizer, innovation characteristics are associated with the level of knowledge and interest (Table 11). Emerging farmers' perceptions on the innovation characteristics shows that the organic fertilizers are not getting optimal value with an overall score less than 3. Similarly, the achievement of its adoption is still low. If the two variables are linked, it is evident that there is a significant positive relationship between characteristics of innovations and the stage of the adoption of knowledge and interests, while the implementation phase is not significantly visible.

Table 11. Values and Significant Correlation Coefficient of Farmer's Characteristics with Innovation Adoption Stage of Organic Fertilizer

Innovation Characteristics	Adoption Stage of Organic Fertilizer					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
Complexity	**.252****	.006	**.272****	.003	.088	.342
Compatibility	**.288****	.001	**.275****	.002	.096	.300
Observability	**.286****	.002	**.271****	.003	.077	.408
Trialability	**.290****	.001	**.274****	.003	.089	.337
Relative advantage	**.291****	.001	**.261****	.004	.090	.331

* significant at α ≤ 0.005 and the value on ≤ 0.001 **

Table 12. Values and Significant Correlation Coefficient of Farmer's Characteristics with Innovation Adoption Stage of Fermented Feed

Innovation Characteristics	Adoption Stage of Fermented feed					
	Knowledge		Interest		Adoption	
	Coef	Sig	Coef	Sig	Coef	Sig
Complexity	.123	.350	**.234***	.010	**.184***	.045
Compatibility	.118	.369	**.241****	.008	**.201***	.008
Observability	.115	.383	**.226***	.014	**.197***	.032
Trialability	.110	.404	**.237****	.010	**.189***	.039
Relative advantage	.111	.398	**.243****	.008	**.193***	.036

* significant at $\alpha \leq 0.005$ and the value on ≤ 0.001 **

In contrast to organic fertilizers, fermented feed is associated with innovation at the stage of interest and adoption (Table 12). It is clear that the poor level of interest in the use of fermented feed has something to do with the less positive perception of farmers on this innovation. Judging from variables, farmers' interest in and implementation of fermented feed is low because they thought that the fermented feed is too complex, poorly suited to local conditions, difficult to see the comparison of the results with previous technology, less measurable on a small scale, and less favorable compared to the previous habits. Results of research by Farquharson (2013) also show that interest in agricultural technology also encourages farmers to adopt it.

References

Central Bureau of Statistics Indonesia, (2011). http://www.bps.go.id/tab_sub/view.php?kat=1&tabel=1&daftar=1&id_subyek=06&notab=2

Djayanegara, A. (2005). Establishment of Communication Network System Palm-Cow Integration. (Paper of Workshop on System Development Integration of Palm-Cow). Center for Livestock Research and Development. Indonesia Agency for Research and Development, Ministry of Agriculture

Farquharson, R, J., Mc,Corkell, M.B., Scott, J.F., Sotheary.E., Phaloeun,C. (2013), Characteristics of an Agricultural Innovation and Incentives for Adoption: Rhizobium in Cambodia Characteristics of an Agricultural Innovation and Incentives for Adoption: Rhizobium in Cambodia. International Journal of Environmental and Rural Development (2013) 4-2

Leeuwis. C. (2009). Communication for Rural Innovation, Rethinking Agricultural Extension. New Jersey: Wiley-Blackwell

Rogers, E.M..(2003. Diffusion of Innovations. Fifth Edition. New York: The Free press

Suryanti, R. (2011). Application of Integration of Plant and Livestock Business as well as Agriculture Extension Needs (Case of Integration of Cocoa and Cattle Business in Harau Sub-District, Lima Puluh Kota District). (Master dissertation Andalas University)

Van den Ban AW dan Hawkins HS. (2002). Agricultural Extension. New Delhi: CBS Publishers & Distributors

Zander,K.K., Mwacharo,J.M., Drucker,A.G., Garnett,S.T. (2013). Constraints to effective adoption of innovative livestock production technologies in the Rift Valley (Kenya). Journal of Arid Environments. Volume 96, September .